REMARKS

Claims 1-6, 9-11, 18-22 and 29-32 are rejected under 35 USC §103 as being clearly anticipated by Manolatou et al., Journal of Lightwave Technology, vol. 17, no. 9, entitled "High-Density Integrated Optics."

Claim 1 recites an input port for receiving input optical signals from a first waveguide. A three dimensional high transmission cavity structure receives the input optical signals and interconnects the first waveguide to a second waveguide. The three dimensional high transmission cavity structure includes at least four straight edges that are orthogonal and have a finite width and thickness.

Claim 9 recites an input port for receiving input optical signals from an input waveguide. A three dimensional splitting structure receives the input optical signals and splits the input optical signals into at least two separate signals that are directed to at least two output waveguides. The three dimensional splitting structure includes at least two separate optical cavities connected to their sides, wherein each of the optical cavities includes at least four straight edge sides that are orthogonal with a finite width and thickness.

Claim 29 recites a plurality of straight waveguides. A plurality of three dimensional high transmission cavity elements interconnect the plurality of straight waveguides to form the optical resonator. The three dimensional high transmission cavity elements include at least four straight edges that are orthogonal and of a finite width and thickness.

Manolatou et al. describe a *two-dimensional* finite difference time domain (FDTD) simulations of low-loss right-angle waveguide bends, T-junctions and crossings, based on high index-contrast waveguides. Such structures are essential for the dense integration of optical components. Note also that Manolatou et al. utilizes only two high transmission cavity structures.

In contrast, independent claim 1 recites a three-dimensional high transmission cavity structure and independent claim 29 recites three-dimensional high transmission cavity elements. Manolatou et al. do not address issues concerning a three-dimensional high transmission cavity structure. The high transmission cavity structures described throughout Manolatou et al. are two-dimensional. Secondly, the claimed three-dimensional high transmission cavity structure includes a finite thickness. Therefore, the article of Manolatou et al. does not anticipate claims 1 and 29.

As to claims 2-6 and 30-32, they are dependent on claim 1, respectively. Therefore, claims 2-6 are also allowable for the same reasons argued with respect to claim 1.

In addition, independent claim 9 recites a three dimensional splitting structure that includes at least two separate optical cavities connected to their sides, wherein each of said optical cavities includes at least four straight edge sides that are orthogonal with a finite width and thickness. Manolatou et al. do not address issues concerning a three-dimensional splitting structure. The splitting structures described throughout Manolatou et al. are two-dimensional. Secondly, the claimed three-dimensional splitting structure includes a finite thickness. Given that Manolatou et al. describe two-dimensional splitting structures, none of these splitting

structures include a thickness because of the inherent limitation that two-dimensional structures do not have a thickness. Furthermore, Manolatou et al. do not explicitly state that their splitting structures have any thickness. Therefore, the article of Manolatou et al. does not anticipate claim 1.

The Examiner states in the Final Office Action that the article of Manolatou et al. does not limit its geometry to simply a two-dimensional interconnecting structure. However, Manolatou et al. describe the operational principles by using 2-D numerical simulations of a collection of example structures made of high index-contrast single-mode waveguides. The concept presented in this reference is very general and could be applied using a variety of resonant structures. Moreover, Manolatou et al. describe that an accurate estimation of the polarization dependence as well as the leakage of radiation into the substrate require 3D simulations for a more realistic design. Furthermore, Manolatou et al. state that it only analyzes 2-D structures for ease because it would be computationally intensive to do otherwise. This does not imply or support the position that Manolatou et al. describe three-dimensional structures. In fact, it supports the position that the article of Manolatou et al. does not describe or support 3-D structures. Therefore, the Manolatou et al. article does not teach or suggest a three-dimensional interconnecting structure as recited in the claims 1, 9 and 29.

As to claims 10-11 and 18-22, they are dependent on claim 9, respectively. Therefore, claims 10-11 and 18-22 are also allowable for the same reasons argued with respect to claim 9.

Claims 7, 12, 14-17, 23, 25-28 and 33 are rejected under 35 USC §103 as being unpatentable over Manolatou et al. in view of an article by Tang et al., IEEE Proc-Optoelectro., vol. 143, no. 5, October 1996.

Tang et al. describe using silicon microelectronics fabrication methods to fabricate low-loss silicon integrated optical devices of dimensions which are compatible with single mode fibers and operate at the important wavelengths of 1.3 and 1.5 μm.

Given that claims 7, 12, 14-17, 23, 25-28 and 33, are dependent on claims 1, 9, and 27, the reasons argued for claims 1, 9, and 27 are also applicable here. Also, Tang et al. do not address the deficiencies of Manolatou et al. Therefore, the proposed combination of Manolatou et al. and Tang et al. does not render obvious claims 2, 12, 14-17, 23, 25-28 and 33.

Claims 8, 13, 24 and 34 are rejected under 35 USC §103 as being unpatentable over Manolatou et al. in view of Kitamura, U.S. 5,949,931.

Kitamura '931 describes an optical coupler having a substrate, an optical waveguide provided on the substrate, a multimode fiber optically coupled with the optical waveguide, and a single mode fiber optical coupled wit the optical waveguide.

Given that claims 8, 13, 24 and 34, are dependent on claims 9 and 27, the reasons argued for claims 9, and 27 are also applicable here. Also, Kitamura '931 does not address the deficiencies of Manolatou et al. Therefore, the proposed combination of Manolatou et al. and Kitamura '931 does not render obvious claims 8, 13, 24 and 34.

In view of the above amendments and for all the reasons set forth above, the Examiner is respectfully requested to reconsider and withdraw the objection and rejections made under 35 U.S.C. §§102 and 103. Accordingly, an early indication of allowability is earnestly solicited.

If the Examiner has any questions regarding matters pending in this application, please feel free to contact the undersigned below.

Respectfully submitted,

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